VI. WATER DROPWORT-FLOWERING RUSH COMMUNITIES – OENANTHETALIA AQUATICAE

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Historical review

The vegetation of medium-height waterside communities has been rather poorly investigated. Several associations and subassociatons of this order are specific for the Pannonian floral province, as their loci classici can be found here, therefore they are of great importance in respect of nature conservation and phytogeography. Many of these cenotaxa are named (e.g. Ubrizsy 1948: *Eleocharicetum palustris*, Máthé and Kovács 1967: *Alismato-Eleocharicetum*) or described (Soó 1928: *Oenanthe aquaticae-Rorippetum amphibiae*, Tímár 1947: *Butomo-Alismatetum lanceolati*) by Hungarian botanists for the first time. Along the river Tisza, these associations were studied firstly by Timár (1950) in the river-section Szolnok-Szeged. Later Bodrogközy (1990) carried out researches on these vegetation-types especially in the Bodrogzug. Recently Deák (2001) made coenological surveys in the Csongrád-Nagyrét nature reserve.

The cenological classification of floodplain swamps dominated by *Bolboschoenus maritimus* is not homogeneous (Bölöni *et al.* 2003), as the stands are classified into the group of „Water-fringing helophyte beds of Flowering rush, Spike-rush, Water-plantain, Fine-leaved water dropwort swamps" (B3) according to the Hungarian habitat classification system. According to the latest results, the *Polygono-Bolboschoenetum* and its subassociations – *typicum, oenanthetosum, Rumex conglomeratus* – described and surveyed by Bodrogközy in 1961 in Tiszafüred (Bodrogközy 1965) can also be classified into this habitat type. In the Vojvodinian Tisza river section, these communities are also named as *Scirpo-Phragmitetum bolboschoenetosum maritim*, where the appearance of *Bolboschoenus maritimus* is considered the consequence of salt-accumulation (Parabucski *et al.* 1989). The monodominant *Sagittaria sagittifolia* marsh is not yet described as an association, but its stands appear sporadically alongside the river Tisza at several places.

From among the associations classified into the Oenanthelia aquaticae order (Borhidi and Sánta 1999) *Eleocharicetum palustris* Ubrizsy 1948, *Alismato-Eleocharicetum* Máthé & Kovács 1967, *Oenantho aquaticae-Rorippetum amphibiae* (Soó 1928) Lohm. 1950, and *Butomo-Alismatetum lanceolati* (Tímár 1947) Hejny 1969 appear alongside the river Tisza. *Butomo-Alismatetum plantaginis-aquaticae* (Slavnic 1948) Hejny 1978 is known only from the region of river Danube whereas *Hippuridetum vulgaris* Pass. 1955 just alongside the rivers Drava and Danube.

The order is characterized by very fast and diverse dynamical processes, thus the abundance ratios given in the literature can often not be observed in the stands. The transitional types are very frequent, their abundance relations can change year by year. *Bolboschoenus maritimus* appears often in great proportion in the *Butomo-Alismatetum lanceolati* association. Other stands show transitions into *Caricetum gracilis*, floodplain high-weed communities, *Phragmitetum communis* or *Typhetum angustifoliae*. If they dry out fast, *Xanthium italicum* can attack them. If the water remains more permanent the coverage of *Alisma lanceolatum* can increase in *Butomo-Alismatetum lanceolati* association.

These communities are typical in the zonation of the backwaters (plesiopotamals) inside the dikes, but they can appear at the oxbow-lakes (paleopotamals) of the saved-side which could be converted arable lands but are covered by inland water during the spring. According to the surface water-coverage and the seasonal changes of the ground-water, certain species gradient may develop that influences the development of the associations, subassociations and their transitions. The members of this species-gradient are ordered as *Oenanthe aquatica – Eleocharis palustris – Alisma lanceolatum – Sagittaria sagittifolia – Butomus umbellatus – Bolboschoenus maritimus – Carex gracilis* – floodplain high-weed species (*Lythrum* spp., *Lysimachia vulgaris*) from the open water-surface to the littoral zone. Because of the annual changes of the water-regime, transitional and incomplete stands can be formed.

VI.1 *Eleocharitetum palustris* (Ubrizsy 1948)

Habitat-characteristics

This community was described from the channels of the rice-fields of Tiszántúl on alkali-sodic soils (Borhidi and Sánta 1999, Bölöni *et al.* 2003), but it can appear in smaller stands alongside the floodplain channels, in navvy-holes, in the littoral zonation of oxbow-lakes inside the dikes due to particular water regime, soil and water chemical conditions.

General features of the species composition

In general the monodominant *Eleocharis palustris* populations constitute the vegetation, but *Typha angustifolia, Alisma gramineum, Alisma lanceolatum* and *Schoenoplectus supinus* used to occur (Borhidi and Sánta 1999). Some reed-grass species such as *Najas minor* and *Zannichellia palustris* can also appear (Bölöni *et al.* 2003).

Differences of the stands

Alisma gramineum and *Schoenoplectus supinus* are considered as rarer species, their presence increases the nature conservation value of the stands.

Localities

Csongrád, Nagy-Gombás (Csongrád-Nagyrét Nature Reserve); Hódmezővásárhely, Ányási Holt-Tisza (Mártély Landscape Protection Area).

Further comments

It is often difficult to distinguish from the *Alismato-Eleocharitetum* as their features are similar.

VI.2 *Alismato-Eleocharitetum* (Máthé & Kovács 1967)

Habitat-characteristics

The stands of this community develop on flat floodplains inside the dikes, on fresh alluvium which is regularly flooded for a long period each year (Borhidi and Sánta 1999). Flood lasts until the beginning of summer, but after the fast drying-out the area remains wet during the summer and dries out completely at the end of summer. Small stands are widespread.

General features of the species composition

Beside the dominant *Eleocharis palustris, Carex gracilis, Ranunculus repens* and the moss *Drepanocladus aduncus* have greater coverage. Further characteristic species are *Carex vulpina, Gratiola officinalis* and *Lythrum hyssopifolia* (Borhidi and Sánta 1999, Bölöni *et al.* 2003). *Iris pseudacorus, Alisma lanceolatum, Butomus umbellatus* or even *Bolboschoenus maritimus* appear frequently in the South-Tisza Floodplain in this comunity.

Differences of the stands

After the ceasing of the floods, it can transform to a sedge-field (Borhidi and Sánta 1999), but depending on the flood dynamics many kinds of transition can be formed towards the *Butomo-Alismatetum lanceolati, Caricetum gracilis* or flood-plain *Bolboschoenus* marshes. The dynamics and dominance relations of this community may alter broadly year by year depending on the floods.

The stands that contain *Gratiola officinalis* and *Lythrum hyssopifolia* are rare therefore they have a major nature conservation values.

Localities

Navvy-holes on the Csongrád-Szeged Tisza-river section, Nagy-Gombás (Csongrád-Nagyrét Nature Reserve); Hódmezővásárhely, Ányási Holt-Tisza (Mártélyi Landscape Protection Area).

Furtehr comments

The coeno-taxonomical classification of the transitional stands is difficult.

VI.3 *Oenantho aquaticae-Rorippetum amphibiae* (Lohmeyer 1950)

Habitat-characteristics

The stands of this association develop on floodplain depressions (oxbow lakes, channels, navvy-holes) inside the dikes which dry out regularly in the summer and are filled with fresh alluvium of silt, sand and clay. The water of this habitat is rich in nutrients. The annual water-level fluctuation is great. This community can only colonize dry habitat patches (Borhidi and Sánta 1999, Bölöni *et al.* 2003).

General features of the species composition

In its typical development, the association has two layers. *Rorippa amphibia* and *Oenanthe aquatica* are often co-dominants, but the spring season used to be dominated by *Rorippa amphibia*, whereas in the late summer aspect *Oenanthe aquatica* is dominant. Frequent accompanying species are *Ranunculus sceleratus*, *Polygonum amphibium* and *Myosotis palustris* (Borhidi and Sánta 1999, Bölöni *et al.* 2003).

Differences of the sites

In case of improper water dynamics this vegetation may transform to its neighbouring habitats and associations: to sweet-grass swamps, sedge-fields (*Caricetum gracilis*), and *Bidention* or other associations classified into the *Oenanthetalia aquaticae* order.

Since this habitat is rather rare its stands have great nature conservation importance.

Localities

Csongrád, Nagy-Gombás (Csongrád-Nagyrét Nature Reserve), navvy-holes of the Csongrád-Nagyrét Nature Reserve, Keselyzugi Holt-Körös (in Szentes opposite to this nature reserve).

Further comments

In case of sudden early summer dry-out or more permanent aridity, the *Rorippa amphibia* dominated spring-ascpect can be transformed with occupation of floodplain ruderal species to a *Bidentalia* community by the autumn of that year.

VI.4 *Butomo-Alismatetum lanceolati* ([Tímár 1947] Hejny 1969)

Habitat-characteristics

The European distribution of this continental association is not known properly. It is typical in the littoral zone of shallow (10-20 cm deep), rapidly warming wetlands (navvy-holes, oxbow-lakes inside the dikes) with seasonal floods. It tolerates the slightly alkali-sodic soils, therefore it can appear in channels and archeopotamals of saline areas.

General features of the species-composition

The dominant species of the association is *Butomus umbellatus*, its most common accompanying species is *Alisma lanceolatum* but *Sparganium erectum* and *Sagittaria sagittifolia* are also frequent. Other species dominant in other associations of this order may also appear (e.g. *Eleocharis palustris*).

Differences of the stands

Those stands that are rich in *Carex gracilis* are transitional towards *Caricetum gracilis* sedge-fields. *Bolboschoenus maritimus* appears very frequently and may become co-dominant. Frequent accompanying species come from floodplain meadows, high-weed communities and sedge-fields (e.g. *Lysimachia vulgaris, Lythrum salicaria, Symphytum officinale, Mentha aquatica*).

The late-drying stands are open and have just a few species (*Sagittaria sagittifolia* should be more common here), in the autumn floodplain ruderal species (e.g. *Polygonum amphibium*) can appear.

It is a rare association, all the stands have very important nature conservation value.

Localities

Once it has covered great areas alongside the river Tisza before the regulation of the river-ways being a very typical association of the floodplains. Many of its earlier sites are extinct. Existing stands:

Szolnok, Scheftschik-rét
Szandaszőlős, Rákóczifalva: oxbow lake inside the dikes
Alpári-rét, Tiszaalpár (Kiskunság National Park)
Háromág, Búzás and Téfölös oxbow lakes of Bokros-puszta
Csongrád, Nagy-Gombás and Szakadás oxbow lakes (Csongrád-Nagyréti Nature Reserve)
Navvy-holes of Csongrád-Nagyrét Nature Reserve
Small patches in the navvy-holes of the Csongrád-Szeged river section
Körtvélyesi and Ányási Holt-Tisza, Hódmezővásárhely (Mártély Landscape Protection Area)
Hódmezővásárhely, Vajhát
Navvy-holes of Tápai-rét

Further comments

The transitions are frequent toward large sedges and *Bolboschoenus* dominated swamps.

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